MAR 15 1990

FLOOD INSURANCE STUDY

CITY OF ALLEN CITY, KENTUCKY
FLOYD COUNTY

REVISED

MARCH 19, 1990

Federal Emergency Management Agency

COMMUNITY NUMBER · 210070

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

This publication incorporates revisions to the original Flood Insurance Study. These revisions are presented in Section 9.0.

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1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the incorporated areas of the Town of Allen, Floyd County, Kentucky, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert Allen to the regular program of flood insurance by the Federal Emergency Management Agency (FEMA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these Federally-supported studies are based. These criteria take precedence over the minimum Federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 44 CFR, 60.3 (d). In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Authority and Acknowledgments

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Department of the Army, Huntington District, Corps of Engineers (COE), Huntington, West Virginia, with technical support from the Louisville District, Corps of Engineers, for the Federal Emergency Management Agency, under Interagency Agreement No. IAA-H-9-79, Project Order No. 26. This study was completed in July 1981.

1.3 Coordination

Coordination of this study included notification of the Chairman, Board of Directors for the Town of Allen, in a letter dated December 18, 1979, of the initiation of the study.

Coordination meetings were held at the call of the Consultation Coordination Officer (CCO) for Floyd County and were attended by Huntington District personnel, community representatives, and FEMA. The Initial Coordination Meeting was held on November 15, 1978. This report was presented to local officials and interested citizens at the final consultation and coordination meeting held on May 24, 1982, with results of the study being acceptable to the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated areas of the Town of Allen, Floyd County, Kentucy. The area of study is shown on the Vicinity Map (Figure 1).

The limits of the areas studied were chosen by the CCO and community representatives at the initial coordination meeting in November 1978.

Floods caused by overflows from Levisa Fork (river mile 64.87 to 65.23) and Beaver Creek (river mile 0 to mile 0.62) were studied in detail. These areas were selected with priority given to all known flood hazard areas, and areas of projected development or proposed construction for the next five years, through July 1986.

2.2 Community Description

The Town of Allen is located in north central Floyd County, in eastern Kentucky. In 1980 the population of Allen was 325, which is a 55 percent decrease of the 1970 population (Reference 1). Beaver Creek flows northeasterly through town, to its confluence of Levisa Fork. Levisa Fork flows in a northwesterly direction.

Allen is located within the Cumberland Plateau section of the Appalachian physiographic province. Allen lies partially within the valley floor of Beaver Creek and Levisa Fork, which is composed of deep, somewhat poorly drained to well drained soils that formed in alluvium washed from upland soils underlain by sandstone and shale (Reference 2).

The climate of Allen is generally temperate. The average temperature fluctuates between 32 degrees F and 40 degrees F in winter and 70 degrees F and 79 degrees F in summer. The mean annual rainfall is 44 to 48 inches.

23. Principal Flood Problems

Floods may occur in Allen during any season of the year and may result from both periods of general rainfall over the entire area and from short intense periods of localized thunderstorms common to the region. The main sources of flooding for Allen are Beaver Creek and Levisa Fork.

2.4 Flood Protection Measures

There are three upstream flood control reservoirs on Levisa Fork and upstream tributaries which reduce flood levels in Allen. These projects were constructed by the COE. Fishtrap Lake has been regulated since October 1968 and is located on Levisa Fork in Pike County, Kentucky, 103.3 miles above its mouth. John W. Flannagan Dam and Reservoir has been regulated since

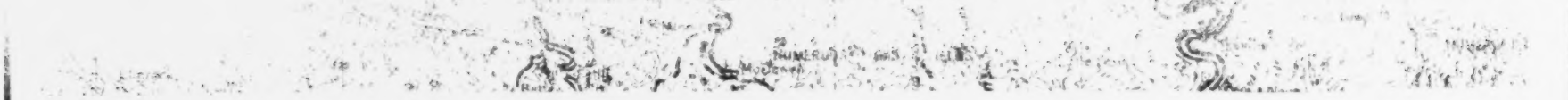


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF ALLEN CITY, KY
(FLOYD CO.)

APPROXIMATE SCALE

MILES

VICINITY MAP

March [illegible] is located on [illegible], a tributary of [illegible] Levisa Fork in Letcher County, Virginia. [illegible] is located on the [illegible] of Levisa Fork. [illegible] is located on the North Fork of [illegible] and is located on the North Fork of [illegible], a tributary of [illegible] Fork of Levisa Fork in Wise County, Virginia. [illegible] is located on the [illegible] of Levisa Fork.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, and 500-year period (recurrence intervals), have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equalled or exceeded [illegible] Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one percent chance of annual occurrence) in any 50 year period is about 40 percent (four in 10), and for any 90 year period the risk increases to about 60 percent (six in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail in the community.

The discharges for the frequency floods for the community of Allen were developed as part of the analysis for the Floyd County (unincorporated areas) flood insurance study, which is discussed in the following paragraph.

The number of U.S. Geological Survey (USGS) gaging stations on the streams of Floyd County, Kentucky, is very limited. An in-depth study of these gages and those in the headwater area of Levisa Fork in the states of Kentucky and Virginia were added to make a comprehensive study of [illegible] Virginia were added to make a comprehensive study of this region. These areas are basically in the same type of flood region and hydrologic area as established by the USGS (Reference 3). The study was made in accordance with the Water Resources Council (WRC) Bulletin No. 17A (Reference 4). Initially a number of the stations had some modified peak values through lake regulation. In order to enhance any relationships developed, natural flows were reconstructed whenever possible. Using the Hydrologic Engineering Center (HEC) "Regional Frequency Computation" program (Reference

5), gaging stations with a short period of record were extended by longer record stations, provided the correlation coefficient between the stations was within acceptable limits. Determination of the final discharge-frequency curves considered omission of low and high outliers, weighting with the generalized skew, and historically adjusting the curves where possible.

The mountainous terrain of Floyd County resulted in urbanization having minimal effect on the final discharge frequency curves. In the final analysis, nine stations were used to develop natural discharge versus drainage area relationships for the 10-, 50-, 100-, and 500-year frequency floods. These curves are applicable for all gaged and ungaged streams in Floyd County watersheds with the exception of Levisa Fork, which required a separate study, discussed later in this section. Table 1 shows natural discharges at various points along each stream studied in detail based on the aforementioned analysis.

An analysis of several floods indicated that flood peaks on Floyd County streams, tributary to Levisa Fork, occur prior to mainstem flooding.

One tributary which has changing runoff characteristics is Beaver Creek. The higher runoff rate from the forks, in comparison to the Beaver Creek mainstem, is discussed below. Beaver Creek's origin is the confluence to Left Fork Beaver Creek and Right Fork Beaver Creek. These tributary watersheds are adjacent basins and have a north to south alignment. Major flooding along Beaver Creek necessitates flood producing storms contributing from both forks. Flood flows of various magnitudes from the high stream gradient headwaters travel down each fork to the low stream gradients existing at the mouth of Left Fork Beaver Creek, and along Beaver Creek. Greatly reduced water velocities, together with a natural left overbank ponding area existing at the confluence area (Beaver Creek origin), and timing of contributing flood peaks from the above tributaries will effectively reduce the total Beaver Creek discharges. Therefore, Beaver Creek discharges in this area will be less than the flow summation of the forks.

The peak discharge-drainage area relationships for the selected recurrence intervals are presented in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
LEVISA FORK 1					
Downstream of confluence of Beaver Creek	1,602	37,900	57,200	67,700	96,500
Upstream of confluence of Beaver Creek	1,362	36,400	54,000	63,500	88,000
BEAVER CREEK					
At mouth	240	21,300	33,800	39,200	54,000

The source of the 100-year discharges for the streams studied by the approximate method is the same as the regionalized curves developed for Floyd County detail studies.

Levisa Fork required a separate study from other streams studied in Floyd County. Under existing conditions, Levisa Fork flows are actually in a modified condition reflecting upstream reservoirs regulating the natural flow. To properly evaluate each gaging station on Levisa Fork, all stations had to have modified peaks restored to their natural peaks. This process varied from station to station because of the number of reservoirs affecting gage flow and the date that the reservoir was constructed. An analysis was made and natural discharge frequency curves were developed for Levisa Fork gaging stations. Relationships were developed to compare natural versus observed modified flows to reflect all existing reservoirs for each station. From these data, modified flow discharge frequency curves could be developed for any of the studied gages.

Modified discharge frequency curves were drawn for the USGS gaging stations for the Levisa Fork stations at Pikeville Kentucky (upstream of Floyd County), and Paintsville, Kentucky (downstream of Floyd County). As was previously discussed, peak flows from major floods occur on Levisa Fork at a time when flows on Floyd County tributaries are past their peak. This results in little tributary contribution to the large magnitude of flow on Levisa Fork. Therefore, it was determined that modified discharges can be best represented by a linear relationship between gaging stations on a stream mile versus drainage plot. Table 1 shows modified discharges at two points along Levisa Fork, based on the established relationship.

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the flooding sources studied in detail in the Town of Allen were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of the flood sources.

Water-surface elevations of floods of the selected recurrence intervals were computed through the use of the HEC-2 computer program, "Water-Surface Profiles" (Reference 6). Cross section data for the detail streams were obtained from detailed mapping developed from aerial photography. The below water sections were obtained by actual field measurements. All bridges, culverts, and dams were surveyed to obtain pertinent elevation and structural geometry. Detailed structure plans were obtained whenever possible to document details.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for the selected recurrence intervals. Starting water-surface elevations for Beaver Creek, as well as Levisa Fork at its downstream study limit in the Floyd County (unincorporated areas) Flood Insurance Study, began by slope area computations. Profiles were determined for the 10-, 50-, 100-, and 500-year floods. The portion of Levisa Fork in Allen was extracted from the profiles determined for the more comprehensive study made of this stream in the Floyd County study.

Roughness coefficients (Manning's "n") depend on such factors as type and amount of vegetation, channel configuration, and water depth. Field inspection for each stream studied by the detailed method provided estimated values. Technical literature, such as the U.S. Geological Survey Water Supply Paper (WSP) 1849, "Roughness Characteristics of Natural Channels" (Reference 7), was very useful, Levisa Fork was the only stream having historical profiles to refine these estimated values. This calibration (to the nearest 0.5 foot, where applicable) was useful in improving estimated roughness coefficients on streams without historical profile data. The roughness coefficients (Manning's "n") for the computations were estimated on the base of the detailed method. The roughness coefficients ranged from 0.045 to 0.050 for the main channel and 0.070 for the overbank areas.

The hydraulic analysis for this study area was based on the effects of unobstructed flow. The flood elevations shown on the profiles are valid only if the hydraulic structures remain unobstructed, and dams and other flood control structures operate properly, and do not fail.

All elevations used in this study are referenced to the National Geodetic Vertical Datum of 1929 (NGVD), formerly referred to as Mean Sea Level Datum of 1929; the elevation reference marks used in this study are shown and described on the maps.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by FEMA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100- and the 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps at a scale of 1"=200', with a contour interval of 5 feet (Reference 8). In cases where the 100- and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

Small areas within the flood boundaries may lie above the flood elevations, and therefore, may not be subject to flooding. Owing to limitations of the map scale and/or lack of detailed topographic data, such areas are not shown.

4.2 Floodways

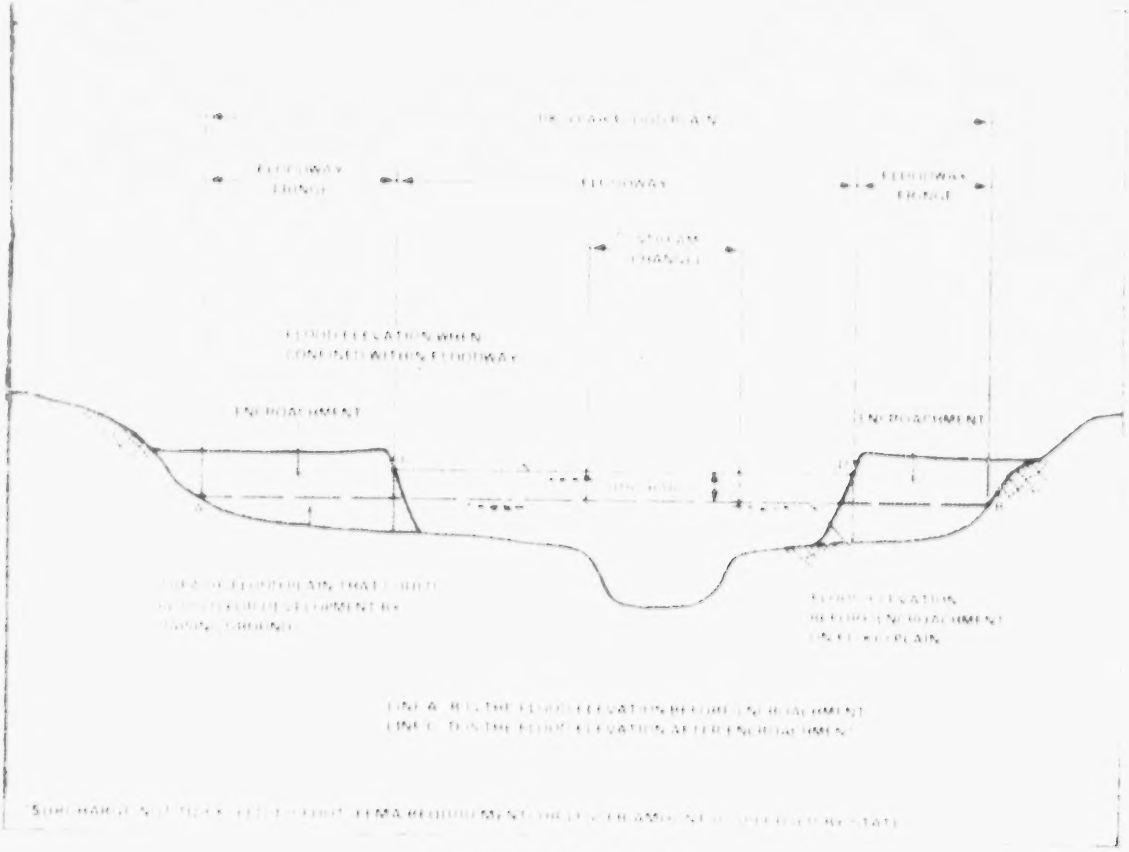
Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of FEMA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this report are presented to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

State or local ordinances on floodways are not more restrictive than this FEMA criteria.

conveyance reduction from each side of the flood plain. The results of these computations are tabulated at selected cross sections of Cleveland Run and Beaver Creek in Floodway Data Table (Table 2).

As shown on the Flood Boundary and Floodway Map (Sheet 2), the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or coincident, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than one foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown on Floodway Schematic (Figure 2).



FLOODWAY SCHEMATIC

Figure 2

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
LEVISA FORK								
A	64.42	435[2]	15,056	4.6	651.0	651.0	651.7	0.7
B	64.87	728[2]	18,597	3.4	651.4	651.4	652.1	0.7
C	65.20	686[3]	11,691	5.5	651.4	651.4	652.1	0.7
D	65.21	602	11,998	5.3	651.5	651.5	652.2	0.7
E	65.22	585	11,993	5.3	651.6	651.6	652.2	0.6
F	65.24	687[2]	11,739	5.4	651.6	651.6	552.2	0.6
BEAVER CREEK								
A	0.09	165	4,801	8.2	651.4	644.0[4]	644.8	0.8
B	0.13	521	8,449	4.6	651.4	646.9[4]	647.8	0.9
C	0.17	565	8,951	4.4	651.4	647.3[4]	648.2	0.9
D	0.24	639	7,336	5.3	651.4	647.3[4]	648.2	0.9
E	0.61	406[3]	8,159	4.8	651.4	648.5[4]	649.4	0.9

[1]MILES ABOVE MOUTH
[2]THIS WIDTH IS BEYOND CORPORATE LIMITS
[3]THIS WIDTH EXTENDS BEYOND CORPORATE LIMITS
[4]ELEVATIONS WITHOUT CONSIDERING BACKWATER EFFECT FROM LEVISA FORK

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF ALLEN [illegible], KY
(FLOYD CO.)

FLOODWAY DATA

LEVISA FORK–BEAVER CREEK

REVISED

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, FEMA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHFs), and flood insurance zone designations for each significant flooding source affecting the Town of Allen.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
Above 12 feet	3.0 feet

One reach meeting the above criteria was required for Levisa Fork. Beaver Creek is in the backwater from Levisa Fork. The location of the reach is shown on the Flood Profiles (Exhibit 1).

5.2 Flood Hazard Factors (FHFs)

The Flood Hazard Factor is used to correlate flood information with insurance rate tables. Correlations between property damages from floods and their assigned FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference between the water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year flood water-surface elevations is greater than 10.0 feet, the accuracy for the FHF is to the nearest foot.

The COE computer program, HEC-2 (Reference 6), which determined the Flood Hazard Factors from the results of the backwater computations, was used to determine the appropriate Flood Hazard Factors for this study.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire unincorporated area of the Town of Allen was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations.

Zone A21:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to FHFs.
Zone B:	Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; or areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Town of Allen is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by FEMA.

6.0 OTHER STUDIES

Flood Insurance Studies are currently being prepared for Floyd County, Martin, and Wayland, Kentucky. The results of these studies will match exactly the Town of Allen study.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100 YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION[3] (FEET NGVD)
		10% (10 YEAR)	2% (50 YEAR)	0.2% (500 YEAR)			
LEVISA FORK							
REACH REACH 1	0001	- 10.53	- 3.32	6.29	110	A21	VARIES SEE MAP

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF ALLEN CITY, KY
(FLOYD CO.)

FLOOD INSURANCE ZONE DATA

LEVISA FORK

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study may be obtained by contacting the Natural and Technological Hazards Division, Federal Emergency Management Agency, 1375 Peachtree Street, NE., Atlanta, Georgia, 30309.

8.0 BIBLIOGRAPHY AND REFERENCES

1. Census of Population and Housing, U.S. Department of Commerce, Bureau of Census, January 1981.

2. Archeological Survey Reports, Floyd County, Kentucky Heritage Council, November 1977.

3. Magnitude and Frequency of Floods in the United States, Part 3A, Ohio River Basin except Cumberland and Tennessee River Basins, U.S. Geological Survey Water-Supply Paper 1675, U.S. Department of the Interior, March 3, 1965.

4. U.S. Water Resources Council, Bulletin No. 17A, Guidelines for Determining Flood Flow Frequencie , June 1977.

5. Generalized Computer Program, Regional Frequency Computation, Hydrologic Engineering Center, July 1972.

6. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water-Surface Profiles, Generalized Computer Program, Davis, California, October 1973.

7. U.S. Geological Survey Water Supply Paper 1849, Roughness Characteristics of Natural Channels, 1967.

8. Aerial Photography, Floyd County, Kentucky, April 28, 1980, Kucera & Associates, Inc., altitude: 6,000 ft. msl; scale of photo 1" = 1,000'.

U.S. Water Resources Council, Flood Plain Management Guidelines for Implementing E.O. 11988, February 10, 1978.

9.0 REVISIONS DESCRIPTION

This section has been added to provide information regarding significant revisions made since the original Flood Insurance Study was printed. Future revisions may be made that do not result in the republishing of the Flood Insurance Study report. To assure that any user is aware of all revisions, it is advisable to contact the community repository of flood hazard data located at the City Hall Building, Main Street, Allen City, Kentucky.

9.1 First Revision (Revised March 19, 1990)

a. Acknowledgments

The hydrologic and hydraulic analyses for this Revisions Description were performed by the U.S. Army Corps of Engineers (COE), Huntington District. The Federal Emergency Management Agency (FEMA) reviewed and accepted these data for purposes of this revision.

b. Scope

All flooding information for Levisa Fork was revised as a result of the COE restudy. Discharges for Levisa Fork were revised as a result of the restudy. The community's name and political designation have also changed.

c. Hydrologic and Hydraulic Analyses

The hydrologic analysis was performed by the COE using procedures described in section 3.1 of this report and in Bulletin No. 17B (Reference 9). A revised recurrence interval of 60 years was adopted. Additional years of stream gage records (1976 to 1985) were used, resulting in revised discharges. Those discharges are given in Table 4, Revised Summary of Discharges.

TABLE 4 - REVISED SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
LEVISA FORK just downstream of confluence of Beaver Creek, at River Mile 64.87	1,362	34,700	53,900	63,900	94,000

The HEC-2 step-backwater computer program (Reference 10) was used to compute the floods of the selected recurrence intervals using the new discharges that were developed by the COE.

Roughness coefficients (Manning's "n") were revised on Levisa Fork. Revised roughness coefficients of 0.052 for the channel and 0.09 for the overbanks were used for this revised reach of Levisa Fork.

Revised flood boundaries along Levisa Fork were delineated using flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps prepared by the COE (Reference 11).

All elevations are referenced to the National Geodetic Vertical Datum of 1929. Elevation reference marks in this revision are shown on the Flood Insurance Rate Map and described in the exhibit labeled Elevation Reference Marks.

d. Insurance Application

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 100-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

The reach determinations, flood hazard factors, and flood insurance zones presented in Sections 5.1, 5.2, and 5.3 of this report and Table 3, Flood Insurance Zone Data, are no longer applicable.

e. Flood Insurance Rate Map

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 9.1d and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents used the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols the 100- and 500-year floodplains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

f. Floodways

Floodway computations for Levisa Fork were revised as a result of revised discharges. The floodways are computed on the basis of equal conveyance reduction from each side of the floodplain. The results of these computations were tabulated at selected cross sections for each stream segment for which a floodway was revised and are presented in Table 2, Floodway Data.

As shown on the Flood Insurance Rate Map, the floodway boundaries were computed at cross sections. Between cross sections, the boundaries were interpolated. In cases where the floodway and the 100-year floodplain boundaries are either close together or collinear, only the floodway boundary has been shown. Portions of the floodway of Levisa Fork lie outside the corporate limits.

Along streams where floodways have not been computed, the community must ensure that the cumulative effect of development in the floodplain will not cause more than a 1.0-foot increase in the base flood elevations at any point within the community.

g. Other Studies

The Flood Insurance Study published for Floyd County (Reference 12) is being revised in conjunction with this study and will be in agreement with this revised study.

h. References and Bibliography

9. U.S. Department of the Interior, Geological Survey, Interagency Advisory Committee on Water Data, Office of Water Data Coordination, Hydrology Subcommittee, Bulletin No. 17B, Guidelines for Determining Flood Flow Frequency, September 1981, revised March 1982.

10. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Computer Program 723-X6-L202A, Davis, California, April 1984.

11. ————, Huntington District, Flood Boundary and Floodway Map and Rate Map Work Map, Scale 1:2400, Contour Interval 5 Feet: Floyd County, Kentucky, April 1980.

12. Federal Emergency Management Agency, Flood Insurance Study, Floyd County, Unincorporated Areas, Kentucky, March 1984, revision in progress.

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
1	0001	650.19	C&GS standard disk northeast of Depot Street along CSX railroad, 18.9 feet south of south end of station, 11.4 feet west of west edge of station platform, 3 feet southwest of pole in concrete post projecting 2 inches, about 1 foot below level of track
2	0001	638.00	C&GS standard disk along CSX railroad at railroad bridge No. 836 over Beaver Creek, 0.15 mile northwest of station, in top of southwest end of southeast stone bridge, 20.2 feet southwest of southwest side of bridge, U.S. Geological Survey standard disk about 3 feet below level of track

FLOOD PROFILES

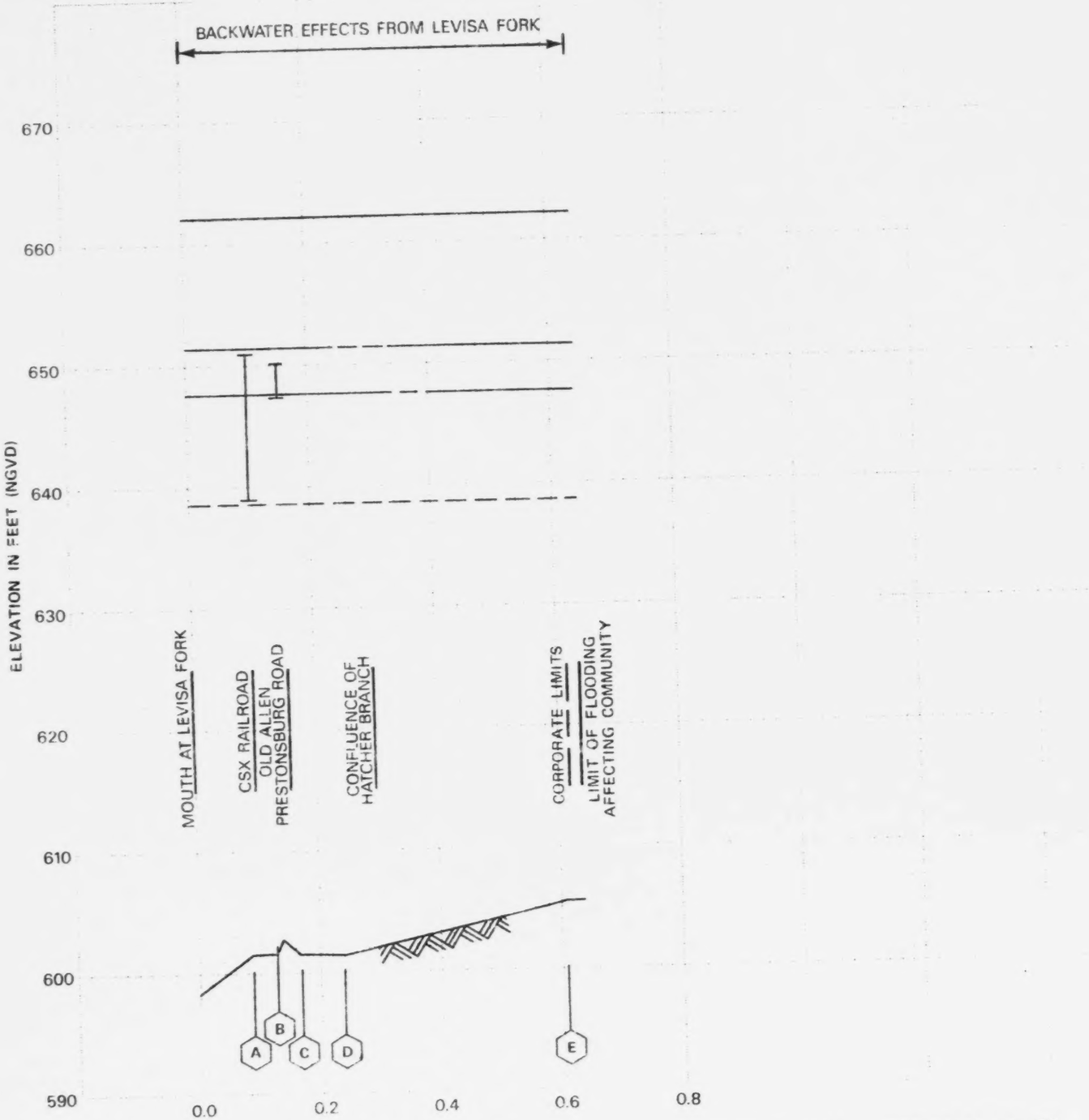
LEVISA FORK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF ALLEN CITY, KY

(FLOYD CO.)

01P



FLOOD PROFILES

BEAVER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF ALLEN CITY, KY
(FLOYD CO.)

02P